



**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re the Application of

Tae-wan KIM et al.

Art Unit: 1763

Serial No. 10/748,277

Examiner: L.L. Alejandro Mulero

Filed: December 31, 2003

Confirmation No. 6602

For: INDUCTIVELY COUPLED ANTENNA AND  
PLASMA PROCESSING APPARATUS  
USING THE SAME

Attorney Docket No. 249/409

**RESPONSE TO NOTIFICATION OF NON-COMPLIANT APPEAL BRIEF**

Commissioner for Patents  
U.S. Patent and Trademark Office  
Customer Window  
Mail Stop Appeal Brief - Patents  
Randolph Building  
401 Dulany Street  
Alexandria, Virginia 22314

Date: October 9, 2008

Sir,

**INTRODUCTORY COMMENTS**

In response to the Notification of Non-compliant Appeal Brief mailed September 10, 2008, and further to the Appeal Brief filed August 6, 2008, the following remarks are respectfully submitted in connection with the above-identified application:

**A Status of the Claims** begins on page 2 of this paper.

**A Summary of the Claimed Subject Matter** begins on page 3 of this paper.

**Remarks** begin on page 7 of this paper.

**STATUS OF THE CLAIMS**

In connection with the Remarks, following is substitute Status of the Claims (Section III of the Appeal Brief filed August 6, 2008), which replaces the original Summary of the Claimed Subject Matter.

**III. STATUS OF THE CLAIMS**

Claims 1, 2, 4, 5, 8-12, 14, 15 and 18-26 are pending in the subject application.

Claims 3, 6, 7, 12, 16 and 17 are cancelled. A copy of claims 1, 2, 4, 5, 8-12, 14, 15 and 18-26 is set forth in the attached Claims Appendix.

Claims 1, 2, 4, 5, 8-12, 14, 15 and 18-26 are on appeal. Of these, claims 1 and 11 are independent claims.

SUMMARY OF THE CLAIMED SUBJECT MATTER

In connection with the Remarks, following is substitute Summary of the Claimed Subject Matter (Section V of the Appeal Brief filed August 6, 2008), which replaces the original Summary of the Claimed Subject Matter.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Embodiments of the claims on appeal generally relate to inductively coupled antennas. More particularly, embodiments of the claims on appeal generally relate to inductively coupled antennas employable by an inductively coupled plasma processing apparatus and inductively coupled plasma processing apparatus including an inductively coupled antenna.

Embodiments of the antennas as recited in each of independent claims 1 and 11 include a single coil having a plurality of turns including an outermost turn and a plurality of inner turns. The outermost turn is connected in parallel with the plurality of inner turns and a sum of the lengths of the plurality of inner turns is longer than a length of the outermost turn.<sup>1</sup> An exemplary embodiment of an inductively coupled antenna and an inductively coupled plasma processing apparatus, as respectively recited in independent claims 1 and 11, are illustrated in drawing FIGS. 4 and 5 of the application, which are reproduced below.

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<sup>1</sup> See the instant application at, e.g., paragraphs [0034] and [0035], page 10, line 17 to page 11, line 8.

FIG. 4

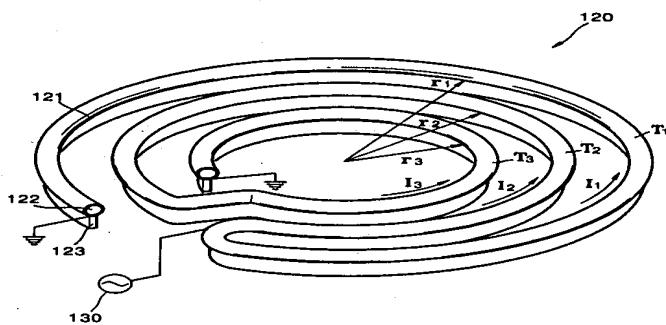
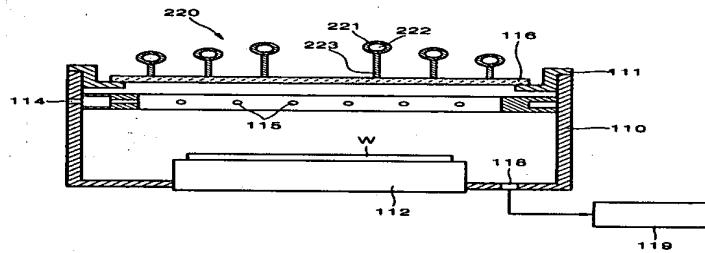


FIG. 5



More particularly, FIG. 4 of the instant application reproduced above illustrates an inductively coupled antenna 120 including an outermost turn T<sub>1</sub>, and a plurality of inner turns, e.g., two inner turns T<sub>2</sub>, T<sub>3</sub>. The outermost turn T<sub>1</sub> is connected in parallel with the inner turns, e.g., T<sub>2</sub>, T<sub>3</sub>, and the inner turns, e.g., T<sub>2</sub>, T<sub>3</sub>, are connected together in series. The

plurality of turns, e.g., T<sub>2</sub>, T<sub>3</sub>, are concentric relative to each other. The sum of the lengths of the inner turns, e.g., T<sub>2</sub>, T<sub>3</sub>, is longer than a length of the outermost turn T<sub>1</sub>.<sup>2</sup>

As illustrated above, the outermost turn T<sub>1</sub> and the inner turns, e.g., T<sub>2</sub>, T<sub>3</sub>, are portions of a single conductive line. Thus, separate connecting structures are not necessary to connect the turns of the antenna 120, and the antenna 120 may be easier to manufacture as compared to, e.g., antennas requiring separate connecting structures to connect turns thereof.<sup>3</sup>

In some embodiments, the antenna 120 includes a conductive tube 121 and a conductive strip 123, e.g., tall and narrow rectangular strip that is electrically and thermally connected to a lower portion of the conductive tube 121. The tube 121 provides a cooling path 122 therein. Referring to FIG. 4, the conductive strip 123 may be coextensive with the tube 121. In some embodiments, the tube 121 has a circular cross-section, as illustrated, e.g., in FIG. 4.<sup>4</sup>

Referring to FIG. 5, an exemplary ICP processing apparatus includes a reaction chamber 110, an antenna 220, a gas injection port 114, a plurality of gas distribution ports 115, and a RF power supply (not shown). The antenna 220 is similar to the antenna 120 illustrated in FIG. 4, and includes a conductive metal tube 221 having a cooling path 222 and a conductive metal strip 223. Separately, embodiments employing an antenna, e.g., 120, 220, as recited in each of independent claims 1 and 11, enable current flowing through the outermost turn T<sub>1</sub> to be controlled, e.g., increased, by controlling the length of radii r<sub>1</sub>, r<sub>2</sub>, and

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<sup>2</sup> *Id.*

<sup>3</sup> *Id.*, paragraph [0039], page 13, lines 3-7.

<sup>4</sup> *Id.*, paragraph [0042], page 13, line 21 to page 14, line 2.

$r_3$  of the turns  $T_1$ ,  $T_2$ , and  $T_3$ . Thus, an induced electric field at an edge portion of the reaction chamber 110 is enhanced and plasma uniformity in the reaction chamber 110 is improved.<sup>5</sup>

Referring to FIGS. 4 and 5, in some embodiments, a height of the metal strip, e.g., 123, 223, may gradually decrease from a center portion to an edge portion of the antenna 120, 220.<sup>6</sup> An antenna including such a conductive strip, e.g., 123, 223, and a cooling path, e.g., 122, 222, may be more efficiently cooled and thus, a shape of the antenna 123, 223 may be more easily maintained, e.g., without the use of an additional support and/or clamp.<sup>7</sup>

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<sup>5</sup> *Id.*, e.g., paragraph [0037], page 12, lines 6-13 and paragraph [0045], page 15, lines 1-10.

<sup>6</sup> *Id.*, e.g., paragraph [0045], page 15, lines 4-6.

<sup>7</sup> *Id.*, e.g., paragraph [0043], page 14, lines 12-18.

REMARKSA. Introduction

On September 10, 2008, a Notification of Non-compliant Appeal Brief was issued in connection with appellants' Appeal Brief filed August 6, 2008. The Notification asserted that the brief does not contain a status of all the claims or a concise explanation of the subject matter defined in the independent claims on appeal (claims 1 and 11) referring to the specification by page and line number. In response to the Notification, appellants respectfully request consideration of the instant response, which provides a substitute Status of the Claims and a substitute Summary of the Claimed Subject Matter.

B. The Content of the Status of the Claims

This paper provides a substitute Status of the Claims, in which claims 3, 6, 7, 12, 16 and 17 are indicated as being cancelled. These claims were previously so indicated in the claims Appendix of the Appeal Brief filed August 6, 2008.

C. The Content of the Substitute Summary of the Claimed Subject Matter

This paper provides a substitute Summary of the Claimed Subject Matter, which replaces Section V of the Appeal Brief filed August 6, 2008. Appellants note that the instant response is filed in accordance with MPEP § 1205.03(B), which provides that, when the Office holds a brief to be defective due to appellants' failure to provide a Summary of the Claimed Subject Matter as required by 37 C.F.R. § 41.37(c)(1)(v), an entire new brief should not be filed and, instead, a paper providing a Summary of the Claimed Subject Matter should be filed.

The originally-filed Appeal Brief was filed with the belief that the Appeal Brief as a whole complied with each and every requirement applicable thereto. However, in view of the Notification of Non-compliant Appeal Brief, the Summary of the Claimed Subject Matter has been revised in order to provide additional references to pertinent portions of the specification and the claims. Additionally, although it is believed that paragraph numbers alone are sufficient to identify the pertinent portions of the specification, the paragraph numbers have been supplemented with references to the page and line numbers of the specification at which they appear.

This substitute Summary of the Claimed Subject Matter does not omit any portion of the original, but rather includes additional remarks regarding those portions of the specification and drawings from which the Summary of the Claimed Subject Matter is drawn.

D. Conclusion

Appellants note that the Summary of the Claimed Subject Matter does not purport to, and is not required to, identify each and every aspect of the subject matter recited in each and every claim, and is thus not to be construed as limiting the scope of the invention, which is defined solely by the claims.

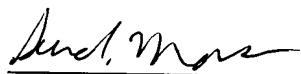
If the Examiner believes that additional discussions or information might advance the prosecution of the instant Appeal, the Examiner is invited to contact the undersigned at the telephone number listed below to expedite resolution of any outstanding issues.

In view of the foregoing amendments and remarks, reconsideration of the Appeal Brief is hereby requested.

Respectfully submitted,

LEE & MORSE, P.C.

Date: October 9, 2008



Susan S. Morse, Reg. No. 35,292

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PETITION and  
DEPOSIT ACCOUNT CHARGE AUTHORIZATION

This document and any concurrently filed papers are believed to be timely. Should any extension of the term be required, appellants hereby petition the Director for such extension and requests that any applicable petition fee be charged to Deposit Account No. 50-1645.

If fee payment is enclosed, this amount is believed to be correct. However, the Director is hereby authorized to charge any deficiency or credit any overpayment to Deposit Account No. 50-1645.

Any additional fee(s) necessary to effect the proper and timely filing of the accompanying-papers may also be charged to Deposit Account No. 50-1645.